REMARKS

Applicant wishes to thank the Examiner for the courtesies extended during the telephonic interview conducted on December 21, 2001. During the interview, the section 112, first paragraph rejection was discussed. Applicant provided an explanation as to how parallax can be reduced by increasing the claimed distance d.

Claims 1-4 and 6-15 are now pending in the application. The amendments to the claims contained herein are intended to broaden the scope thereof and, thus, are not narrowing amendments. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 112

Claims 1-8 stand rejected under 35 U.S.C. § 112, first paragraph. This rejection is respectfully traversed.

In conventional LCDs, parallax gets worse as the distance between a liquid crystal panel and a reflector increases. To solve this problem, the reflector is often placed immediately adjacent the liquid crystal panel. However, this configuration is not always acceptable since other components may need to be placed between the liquid crystal panel and the reflector. Under these circumstances another solution is necessary.

The inventors of the present invention discovered that by providing a diffuser between the liquid crystal panel and the reflector, white light could be recreated before it passed back through the liquid crystal panel. This would eliminate parallax.

As the distance between the diffuser and reflector is increased, the potential for light mixing is enhanced and the recreation of white light is promoted.

In view of the forgoing, it can be appreciated that Table 1 is accurate and this rejection should be withdrawn.

REJECTION UNDER 35 U.S.C. § 103

Claims 1-8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Weber et al., 5,686,979 or Ouderkirk et al., 5,828,488 in view of Mitsui et al. 5,889,570 and Jones et al. 5,949,506. This rejection is respectfully traversed.

Claim 1 calls for a liquid crystal material, a light reflector behind the liquid crystal material, and a forward scattering light diffuser between the liquid crystal material and the light reflector. The light diffuser and light reflector are spaced apart by a specified distance d and the light diffuser has a specified haze value H. The light diffuser and the distance satisfy the relationship: $H(\%) > -200d + 140(mm)$.

Weber and Ouderkirk are completely silent with respect to specified haze values. Weber and Ouderkirk are also completely silent with respect to any specified distance between a light diffuser and a light reflector. Finally, neither Weber nor Ouderkirk teach or suggest the claimed relationship of haze value to distance.

Weber, which teaches a transflective device, discloses a reflective polarizer. Even if this is consider to be the claimed light reflector, the distance between the reflective polarizer and the diffuser is too close to satisfy the claimed relationship. Further, Weber does not describe its diffuser as being forward scattering.

Ouderkirk and Jones teach transmissive devices. This type of device is non-analogous to the claimed invention since the problem solved by the claimed invention, parallax, is not present in a transmissive display. In a transmissive display, the problem of parallax, or mixed color, never exists since all light is generated from a backlight. Parallax only exists when ambient light is reflected for display.

Mitsui teaches directly away from the present invention by suggesting that a parallax causing layer be kept thin. Mitsui teaches the reduction of the distance traveled by the light. The claimed invention calls for increasing space to promote light mixing.

As the Examiner states, neither Weber nor Ouderkirk disclose the claimed relationship of distance d to haze value H. This relationship does more than require an optimization of two result-effective variables. This relationship ensures that proper mixing of light occurs prior to the light returning through the liquid crystal material. Light is properly mixed if the diffuser has forward scattering characteristics of a certain haze value, and the reflector and diffuser are spaced apart by a specified distance. Absent these two complimentary features, proper mixing of the light is uncertain.

In view of the forgoing, reconsideration and withdrawal of the outstanding rejections are respectfully requested.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is

believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to

telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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ATTACHMENT FOR CLAIM AMENDMENTS

The following is a marked up version of each amended claim in which underlines indicates insertions and brackets indicate deletions.

1. (Amended) A display device comprising:

a liquid crystal panel [consisting of substrates and a liquid crystal placed therebetween, a first polarizer provided on one side of the liquid crystal panel,] including a liquid crystal material;

a light reflector provided [on the other side of] behind the liquid crystal panel; [,] and

a light diffuser arranged between the liquid crystal material [panel] and the light reflector, [wherein] the light diffuser having [has] forward scattering characteristics, [and]

a space between the light diffuser and the light reflector being a certain distance;

the light diffuser and the distance satisfying the following relationship:

$H(\%) > -200d + 140(mm)$

wherein d is the distance between the light diffuser and the light reflector, and H is a haze value of the light diffuser

[wherein a distance between the light diffuser and the light reflector is d (mm) and a haze value of the light diffuser is H (%), and: $H \geq -200d + 140$].

2. (Amended) A display device according to Claim 1, further comprising [wherein] a color filter proximate the liquid crystal panel [is provided between the first

polarizer and the lightreflector], the color filter being equipped with a plurality of colors [coloring layers].

3. (Amended) A display device according to Claim 2, wherein the plurality of colors include [color filter has] red [type], green [type] and blue colors [type coloring layers].

4. (Amended) A display device according to Claim 1, further comprising:

a polarizer provided between the liquid crystal panel and the light reflector,

wherein the polarizer substantially transmits a light of a first polarization direction and substantially absorbs a light of a second polarization direction,

wherein the first and the second polarization directions are different from each other

[wherein there is provided between the liquid crystal panel and the light diffuser, a second polarizer for separating incident light according to its polarization component].

6. (Amended) A display device according to Claim 1, further comprising an illuminating device having a [light transmissive] light guiding member and a light source capable of introducing light to the light guiding member,

the illuminating device being arranged between the light diffuser and the light reflector.

7. (Amended) A display device according to Claim 1 [6], further comprising:

a polarizer provided between the liquid crystal panel and the reflector, the polarizer separating light depending on a polarization direction of the light; and

a reflection polarizing plate provided between the polarizer and the reflector, the reflection polarizing plate separating light depending on a polarization direction of the light;

a transmission axis of the polarizer coinciding with a transmission axis of the reflection polarizing plate

[wherein there is provided between the liquid crystal panel and the illuminating device, a second polarizer for separating incident light according to its polarization component,

wherein there is provided a reflection polarizer which is arranged between the second polarizer and the illuminating device and which substantially allows light of a first linear polarization component to be transmitted therethrough and substantially reflects light of a second linear polarization component that is substantially orthogonal to the first linear polarization component, and

wherein the transmission axis of the reflection polarizer and the transmission axis of the second polarizer substantially coincide with each other].

8. (Amended) An electronic apparatus equipped with a display device according to claim 9 [comprising a liquid crystal panel consisting of substrates and a liquid crystal placed therebetween, a first polarizer provided on one side of the liquid crystal panel and adapted to separate incident light according to its polarization

component, a light reflector provided on the other side of the liquid crystal panel, and a light diffuser arranged between the liquid crystal panel and the lightreflector,

wherein the light diffuser has forward scattering characteristics, and

wherein a distance between the light diffuser and the light reflector is d (mm), and a haze value of the light diffuser is H (%), and $H \geqq -200d + 140$].